Remarks

The final Office Action mailed June 30, 2009 has been reviewed and the foregoing amendment and following remarks have been made in consequence thereof

Claims 1, 2, 4-11, and 13-19 are now pending in this application. Claims 1-19 stand rejected. Claims 3 and 12 have been canceled.

The rejection of Claims 9 and 16-19 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,938,607 to Jago et al. (hereinafter referred to as "Jago") in view of U.S. Patent No. 6,984,211 to Hao et al. (hereinafter referred to as "Hao"), U.S. Patent No. 5,559,901 to Lobregt (hereinafter referred to as "Lobregt"), and U.S. Patent No. 6,878,114 to Murashita (hereinafter referred to as "Murashita") is respectfully traversed.

Jago describes an ultrasonic diagnostic imaging system provided to aid in the diagnosis of patient conditions by providing access from an ultrasound system to a library of reference ultrasonic images which may be displayed alongside real-time patient images for diagnosis. The ultrasound system 10 includes a scanhead 14 and a transducer 12 which transmit ultrasonic waves into the subject. A beamformer 16 and a signal processor 64 process the echo data. A display processor 68 then forms the echo data into an image which can be stored in the storage medium 24 and/or displayed on a display 70. A browser 120 is included to allow the operator to retrieve prior scan settings and then set the ultrasound to use the retrieved scan settings. Jago further describes that an operator uses a browser to access system preset data from another ultrasound system or data storage device. The steering code directs the received system preset data to scan a parameter storage 82, where it is stored as custom preset data. An ultrasound system controller 18 will then initialize the ultrasound system to perform ultrasonic scanning in accordance with the operators custom system presets. Notably, Jago does not describe or suggest storing a correlation calculating device for calculating a correlation coefficient between a portion outside of a region of interest in a reference image and a portion outside of the region of interest in a real-time image, an ultrasonic image display device for reading the reference image and displaying the reference image and the real-time image side by side, and a correlation coefficient display device for displaying the correlation coefficient, and in a hold manner, a maximum value

of the correlation coefficient from a beginning of acquisition of the real-time image up to the present, wherein an ultrasonic probe is configured to be adjusted against a subject so that the correlation coefficient becomes equal to the maximum value.

Hao describes an ultrasonic imaging system that includes a transducer array 11 including a plurality of separately driven elements 12 that produce a burst of ultrasonic energy when energized by a pulse produced by a transmitter 13. The ultrasonic energy reflected back to transducer array 11 from the subject under study is converted to an electrical signal by each transducer element 12 and applied separately to a receiver 14 through a set of switches 15. Transmitter 13, receiver 14 and switches 15 are operated under the control of a digital controller 16 responsive to commands input by a human operator. A complete scan is performed by acquiring a series of echoes in which switches 15 are set to their transmit position, transmitter 13 is gated on momentarily to energize each transducer element 12, switches 15 are then set to their receive position, and the subsequent echo signals produced by each transducer element 12 are applied to receiver 14. Separate echo signals from each transducer element 12 are combined in receiver 14 to produce a single echo signal which is employed to produce a line in an image on a display system 17. Notably, Hao does not describe or suggest a correlation calculating device for calculating a correlation coefficient between a portion outside of a region of interest in a reference image and a portion outside of the region of interest in a real-time image, an ultrasonic image display device for reading the reference image and displaying the reference image and the real-time image side by side, and a correlation coefficient display device for displaying the correlation coefficient, and in a hold manner, a maximum value of the correlation coefficient from a beginning of acquisition of said real-time image up to the present, wherein an ultrasonic probe is configured to be adjusted against a subject so that the correlation coefficient becomes equal to the maximum value.

Lobregt describes a space having image parameter values that include a contour 10 including vertices 11, 12, and 13 connected by edges 14, 15, and 16. Further, by variation of a position and a number of vertices as a function of a variation of image parameter values in the space, the contour 10 is determined to follow features in a density variation. Movement of vertices is restricted to a direction (P_i) perpendicular to a local direction (t_i) of a contour 10. For smoothing contour 10, an internal force or energy is defined at each vertex 11, 12, and 13 which

force or energy depends on an angle (c_i) between the edges at the vertex, or of the variation of the angles along a sequence of adjacent vertices. Notably, Lobregt does not describe or suggest a correlation calculating device for calculating a correlation coefficient between a portion outside of a region of interest in a reference image and a portion outside of the region of interest in a real-time image, an ultrasonic image display device for reading the reference image and displaying the reference image and the real-time image side by side, and a correlation coefficient display device for displaying the correlation coefficient, and in a hold manner, a maximum value of the correlation coefficient from a beginning of acquisition of the real-time image up to the present, wherein an ultrasonic probe is configured to be adjusted against a subject so that the correlation coefficient becomes equal to the maximum value.

Murashita describes a transceiver unit 12 that transmits and receives an ultrasound via a probe 10 into and from a space containing a target tissue to output a three-dimensional ultrasonic image for each time phase to a three-dimensional data memory 14. The three-dimensional ultrasonic image obtained for each time phase is converted, by a coordinate converter unit 16, into a display coordinate system and is output to a display image formation unit 20 and edge extractor unit 24 for each time phase. Notably, Murashita does not describe or suggest a correlation calculating device for calculating a correlation coefficient between a portion outside of a region of interest in a reference image and a portion outside of the region of interest in a real-time image, an ultrasonic image display device for reading the reference image and displaying the reference image and the real-time image side by side, and a correlation coefficient display device for displaying the correlation coefficient, and in a hold manner, a maximum value of the correlation coefficient from the beginning of acquisition of the real-time image up to the present, wherein an ultrasonic probe is configured to be adjusted against a subject so that the correlation coefficient becomes equal to the maximum value.

Claim 9 recites an ultrasonic diagnostic apparatus including "an ultrasonic probe; a transmitting/receiving device for driving said ultrasonic probe to transmit ultrasonic pulses into a subject and receive ultrasonic echoes from inside the subject and outputting received data; an ultrasonic image producing device for producing an ultrasonic reference image from the resulting received data, wherein said ultrasonic image producing device is configured to produce a real-time image, said real-time image acquired after providing medical treatment to the subject; a

reference image storage device for storing said reference image, said reference image comprising a region of interest encompassing a region of treatment before providing medical treatment to the subject; a scan condition storage device for storing a scan condition for said reference image; an automatic scan condition setting device for reading said scan condition and setting said scan condition as a current scan condition before providing medical treatment; an automatic region defining device for defining in said real-time image the region of interest encompassing the region of treatment after providing medical treatment to the subject; a correlation calculating device for calculating a correlation coefficient between a portion outside of the region of interest in said reference image and a portion outside of the region of interest in said real-time image; an ultrasonic image display device for reading said reference image and displaying said reference image and said real-time image side by side; and a correlation coefficient display device for displaying the correlation coefficient, and in a hold manner, a maximum value of the correlation coefficient from a beginning of acquisition of said real-time image up to the present; wherein said ultrasonic probe is configured to be adjusted against the subject so that the correlation coefficient becomes equal to the maximum value."

No combination of Jago, Hao, Lobregt, and Murashita describes or suggests an ultrasonic imaging apparatus as recited in amended Claim 9. More specifically, no combination of Jago, Hao, Lobregt, and Murashita describes or suggests a correlation calculating device for calculating a correlation coefficient between a portion outside of a region of interest in a reference image and a portion outside of the region of interest in a real-time image, an ultrasonic image display device for reading the reference image and displaying the reference image and the real-time image side by side, and a correlation coefficient display device for displaying the correlation coefficient, and in a hold manner, a maximum value of the correlation coefficient from a beginning of acquisition of the real-time image up to the present, wherein an ultrasonic probe is configured to be adjusted against a subject so that the correlation coefficient becomes equal to the maximum value. Rather, in contrast, Jao describes an ultrasound system controller that initializes an ultrasound system to perform ultrasonic scanning in accordance with an operator's custom system presets, Hao describes an ultrasonic imaging system that includes a transducer array including a plurality of separately driven elements that produce a burst of ultrasonic energy when energized by a pulse produced by a transmitter, Lobregt describes a

space having image parameter values that include a contour that includes vertices connected by edges, wherein the contour is determined to follow features in a density variation, and Murashita describes a transceiver unit that transmits and receives an ultrasound via a probe into and from a space containing a target tissue to output a three-dimensional ultrasonic image for each time phase to a three-dimensional data memory.

Accordingly, for at least the reasons set forth above, Claim 9 is submitted as patentable over Jago in view of Hao, Lobregt, and Murashita.

Claims 16-19 depend from independent Claim 9. When the recitations of Claims 16-19 are considered in combination with the recitations of Claim 9, Applicant submits that Claims 16-19 are likewise patentable over Jago in view of Hao, Lobregt, and Murashita.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 9 and 16-19 be withdrawn.

The rejection of Claims 1, 6, and 7 under 35 U.S.C. § 103(a) as being unpatentable over Jago, in view of Hao, Lobregt, and Murashita, and further in view of U.S. Patent No. 6,500,123 to Holloway et al. (hereinafter referred to as "Holloway") is respectfully traversed.

Jago, Hao, Lobregt, and Murashita are described above. The Examiner alleges that Holloway describes comparing ultrasound images before and after treatment in order to assess the efficacy of a treatment for a disease. However, even if this allegation is true, Hollow does not describe or suggest a correlation calculating device for calculating a correlation coefficient between a portion outside of a region of interest in a reference image and a portion outside of the region of interest in a real-time image, an ultrasonic image display device for reading the reference image and displaying the reference image and the real-time image side by side, and a correlation coefficient display device for displaying the correlation coefficient, and in a hold manner, a maximum value of the correlation coefficient from the beginning of acquisition of real-time image up to the present, wherein an ultrasonic probe is configured to be adjusted against a subject so that the correlation coefficient becomes equal to the maximum value.

Claim 1 recites an ultrasonic imaging method including "generating a reference image of a subject; storing a reference image and a scan condition used to acquire said reference image; reading said reference image and said scan condition, the reference image comprising a region of treatment encompassed by a region of interest before providing medical treatment to the subject; setting the scan condition as a current scan condition before providing medical treatment; acquiring a real-time image of the subject after providing medical treatment to the subject automatically defining the region of interest in said real-time image encompassing the region of treatment after providing medical treatment to the subject; calculating a correlation coefficient between a portion outside of the region of interest in said reference image and a portion outside of the region of interest in the real-time image; displaying on an ultrasonic image display device said reference image and said real-time image side by side, the correlation coefficient, and in a hold manner, a maximum value of the correlation coefficient from a beginning of acquisition of said real-time image up to the present; and adjusting an orientation of an ultrasonic probe against the subject so that the correlation coefficient becomes equal to the maximum value."

No combination of Jago, Hao, Lobregt, Murashita, and Holloway describes or suggests an ultrasonic imaging method as recited in amended Claim 1. More specifically, no combination of Jago, Hao, Lobregt, Murashita, and Holloway describes or suggests a correlation calculating device for calculating a correlation coefficient between a portion outside of a region of interest in a reference image and a portion outside of the region of interest in a real-time image, an ultrasonic image display device for reading the reference image and displaying the reference image and the real-time image side by side, and a correlation coefficient display device for displaying the correlation coefficient, and in a hold manner, a maximum value of the correlation coefficient from a beginning of acquisition of real-time image up to the present, wherein an ultrasonic probe is configured to be adjusted against a subject so that the correlation coefficient becomes equal to the maximum value. Rather, in contrast, Jao describes an ultrasound system controller that initializes an ultrasound system to perform ultrasonic scanning in accordance with an operator's custom system presets, Hao describes an ultrasonic imaging system that includes a transducer array including a plurality of separately driven elements that produce a burst of ultrasonic energy when energized by a pulse produced by a transmitter, Lobregt describes a space having image parameter values that include a contour that includes vertices connected by

edges, wherein the contour is determined to follow features in a density variation, Murashita describes a transceiver unit that transmits and receives an ultrasound via a probe into and from a space containing a target tissue to output a three-dimensional ultrasonic image for each time phase to a three-dimensional data memory, and Holloway allegedly describes comparing ultrasound images before and after treatment in order to assess the efficacy of a treatment for a disease.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted as patentable over Jago in view of Hao, Lobregt, and Murashita, and further in view of Holloway.

Claims 6 and 7 depend from independent Claim 1. When the recitations of Claims 6 and 7 are considered in combination with the recitations of Claim 1, Applicant submits that Claims 6 and 7 are likewise patentable over Jago in view of Hao, Lobregt, and Murashita, and further in view of Holloway.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 1, 6, and 7 be withdrawn.

The rejection of Claims 2-5 under 35 U.S.C. § 103(b) as being unpatentable over Jago in view of Hao, Lobregt, Murashita, and Holloway, and further in view of U.S. Patent Application Publication No. 2002/0120195 to Hossack et al. (hereinafter referred to as "Hossack") is respectfully traversed.

Jago, Hao, Lobregt, Murashita, and Holloway are described above. Hossack describes a method for combining multiple images to create a single image with a wider field of view. The method includes acquiring at least two images, selecting test blocks from both images, determining a translation value, using the translation value to determine a rotation value, and then applying the translation and rotation values to merge the images into a single image with a wider field of view. Notably, Hossack does not describe or suggest a correlation calculating device for calculating a correlation coefficient between a portion outside of a region of interest in a reference image and a portion outside of the region of interest in a real-time image, an ultrasonic image display device for reading the reference image and displaying the reference image and the real-time image side by side, and a correlation coefficient display device for

displaying the correlation coefficient, and in a hold manner, a maximum value of the correlation coefficient from a beginning of acquisition of the real-time image up to the present, wherein an ultrasonic probe is configured to be adjusted against a subject so that the correlation coefficient becomes equal to the maximum value.

Claim 3 is canceled. Claims 2, 4, and 5 depend from Claim 1, which is recited above.

No combination of Jago, Hao, Lobregt, Murashita, and Hossack describes or suggests an ultrasonic imaging method as recited in amended Claim 1. More specifically, no combination of Jago, Hao, Lobregt, Murashita, and Hossack describes or suggests a correlation calculating device for calculating a correlation coefficient between a portion outside of a region of interest in a reference image and a portion outside of the region of interest in a real-time image, an ultrasonic image display device for reading the reference image and displaying the reference image and the real-time image side by side, and a correlation coefficient display device for displaying the correlation coefficient, and in a hold manner, a maximum value of the correlation coefficient from a beginning of acquisition of the real-time image up to the present, wherein an ultrasonic probe is configured to be adjusted against a subject so that the correlation coefficient becomes equal to the maximum value. Rather, in contrast to the present invention, Jao describes an ultrasound system controller that initializes an ultrasound system to perform ultrasonic scanning in accordance with an operator's custom system presets, Hao describes an ultrasonic imaging system that includes a transducer array including a plurality of separately driven elements that produce a burst of ultrasonic energy when energized by a pulse produced by a transmitter, and Lobregt describes a space having image parameter values includes a contour that includes vertices connected by edges, wherein the contour is determined to follow features in a density variation. Further, Murashita describes a transceiver unit that transmits and receives an ultrasound via a probe into and from a space containing a target tissue to output a three-dimensional ultrasonic image for each time phase to a three-dimensional data memory, Holloway allegedly describes comparing ultrasound images before and after treatment in order to assess the efficacy of a treatment for a disease, and Hossack describes acquiring at least two images, selecting test blocks from both images, determining a translation value, using the translation value to determine a rotation value, and then applying the translation and rotation values to merge the images into a single image with a wider field of view.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Jago in view of Hao, Lobregt, Murashita, and Holloway, and further in view of Hossack.

Claims 2, 4, and 5 depend from independent Claim 1. When the recitations of Claims 2, 4, and 5 are considered in combination with the recitations of Claim 1, Applicant submits that Claims 2, 4, and 5 are likewise patentable over Jago in view of Hao, Lobregt, Murashita, and Holloway, and further in view of Hossack.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 2, 4, and 5 be withdrawn.

The rejection of Claims 10-15 under 35 U.S.C. § 103(b) as being unpatentable over Jago in view of Hao, Lobregt, and Murashita, and further in view of Hossack is respectfully traversed.

Claim 10 depends from Claim 9, which is recited above.

No combination of Jago, Hao, Lobregt, Murashita, and Hossack describes or suggests an ultrasonic imaging apparatus as recited in amended Claim 9. More specifically, no combination of Jago, Hao, Lobregt, Murashita, and Hossack describes or suggests a correlation calculating device for calculating a correlation coefficient between a portion outside of a region of interest in a reference image and a portion outside of the region of interest in a real-time image, an ultrasonic image display device for reading the reference image and displaying the reference image and the real-time image side by side, and a correlation coefficient display device for displaying the correlation coefficient, and in a hold manner, a maximum value of the correlation coefficient from the beginning of acquisition of the real-time image up to the present, wherein an ultrasonic probe is configured to be adjusted against a subject so that the correlation coefficient becomes equal to a maximum value. Rather, in contrast to the present invention, Jao describes an ultrasound system controller that initializes an ultrasound system to perform ultrasonic scanning in accordance with an operator's custom system presets, Hao describes an ultrasonic imaging system that includes a transducer array including a plurality of separately driven elements that produce a burst of ultrasonic energy when energized by a pulse produced by a transmitter, and Lobregt describes a space having image parameter values that include a contour

that includes vertices connected by edges, wherein the contour is determined to follow features in a density variation. Further, Murashita describes a transceiver unit that transmits and receives an ultrasound via a probe into and from a space containing a target tissue to output a three-dimensional ultrasonic image for each time phase to a three-dimensional data memory, and Hossack describes acquiring at least two images, selecting test blocks from both images, determining a translation value, using the translation value to determine a rotation value, and then applying the translation and rotation values to merge the images into a single image with a wider field of view.

Accordingly, for at least the reasons set forth above, Claim 9 is submitted as patentable over Jago in view of Hao, Lobregt, and Murashita, and further in view of Hossack.

Claim 10 depends from independent Claim 9. When the recitations of Claim 10 are considered in combination with the recitations of Claim 9, Applicant submits that Claim 10 is patentable over Jago in view of Hao, Lobregt, and Murashita, and further in view of Hossack.

Claims 11 recites an ultrasonic diagnostic apparatus including "an ultrasonic probe; a transmitting/receiving device for driving said ultrasonic probe to transmit ultrasonic pulses into a subject and receive ultrasonic echoes from inside the subject and outputting received data; an ultrasonic image producing device for producing an ultrasonic reference image from the resulting received data; a reference image storage device for storing said reference image, said reference image comprising a region of treatment encompassed by a region of interest before providing medical treatment to the subject; a scan condition storage device for storing a scan condition for said reference image; an automatic scan condition setting device for reading said scan condition and setting said scan condition as a current scan condition before providing medical treatment; a scan plane angular scanning device for acquiring a plurality of real-time images at different scan plane angles, said plurality of real-time images acquired after providing medical treatment; a correlation coefficient calculating device for calculating a correlation coefficient between said reference image and each of said real-time images throughout or partially; an automatic region defining device for defining in said plurality of real-time images the region of treatment encompassed by the region of interest after providing medical treatment to the subject; an ultrasonic image display device for displaying said reference image and one of said real-time

images having a highest correlation coefficient side by side, and a correlation coefficient display device for displaying said highest correlation coefficient."

No combination of Jago, Hao, Lobregt, Murashita, and Hossack describes or suggests an ultrasonic diagnostic apparatus as recited in amended Claim 11. More specifically, no combination of Jago, Hao, Lobregt, Murashita, and Hossack describes or suggests a scan condition storage device for storing a scan condition for a reference image and an automatic scan condition setting device for reading the scan condition, setting the scan condition as a current scan condition before providing medical treatment, and a correlation coefficient display device for displaying a highest correlation coefficient. Rather, in contrast to the present invention, Jao describes an ultrasound system controller that initializes an ultrasound system to perform ultrasonic scanning in accordance with operators custom system presets, Hao describes an ultrasonic imaging system that includes a transducer array including of a plurality of separately driven elements that produce a burst of ultrasonic energy when energized by a pulse produced by a transmitter, and a space having image parameter values that include a contour that includes a contour including vertices connected by edges, wherein the contour is determined to follow features in a density variation. Further, Murashita describes a transceiver unit that transmits and receives an ultrasound via a probe into and from a space containing a target tissue to output a three-dimensional ultrasonic image for each time phase to a three-dimensional data memory, and Hossack describes acquiring at least two images, selecting test blocks from both images, determining a translation value, using the translation value to determine a rotation value, and then applying the translation and rotation values to merge the images into a single image with a wider field of view.

Accordingly, for at least the reasons set forth above, Claim 11 is submitted to be patentable over Jago in view of Hao, Lobregt, and Murashita, and further in view of Hossack.

Claim 12 is canceled. Claims 13-15 depend from independent Claim 11. When the recitations of Claims 13-15 are considered in combination with the recitations of Claim 11, Applicant submits that dependent Claims 13-15 likewise are patentable over Jago in view of Hao, Lobregt, and Murashita, and further in view of Hossack.

For at least the reasons set forth above, Applicant respectfully requests that the Section 103 rejection of Claims 10-12, 14, and 15 be withdrawn.

In view of the foregoing amendment and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action are respectfully solicited.

Respectfully submitted,

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